Math 1B Quiz 1 Version 1
Wed Apr 19, 2017

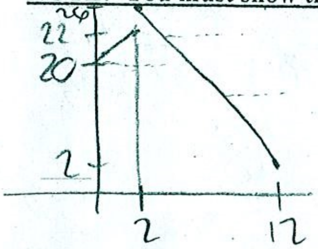
NAME YOU ASKED TO BE CALLED IN CLASS:

SCORE: 27 **/ 30 POINTS**

1. **No calculators / notes / unauthorized paper, electronics or communication allowed**
2. **Simplify all answers unless stated otherwise**
3. **Show proper calculus level work to justify your answers**

A person's velocity (in meters per second) at time t (in seconds) is given by $v(t) = \begin{cases} 20+t, & 0 \le t \le 2 \\ 26-2t, & 2 \le t \le 12 \end{cases}$. **SCORE:** $3\frac{1}{2}$ **/ 5 PTS**

a] Find the exact distance the person travelled from time $t = 0$ seconds to $t = 12$ seconds.
NOTE: You must show the arithmetic expression that you used to get your answer.



$26 - 2(12)$
$26 - 24 = 2$

$\left[\frac{1}{2}(20+22)2 + \frac{1}{2}(26+2)10\right] = \int_0^{12} v(t)\,dt$

1 $\quad 42 + 140$

182 meters

b] Estimate the distance the person travelled from time $t = 0$ seconds to $t = 12$ seconds using three subintervals and left endpoints.
NOTE: You must show the arithmetic expression that you used to get your answer.

$\frac{12-0}{3} = 4 = \Delta t$

$4[v(0)+v(4)+v(8)]$

$4(20 + 18 + 10)$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

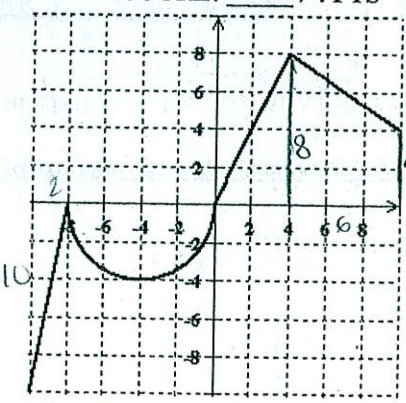
$4(48)$

1 192 meters

$\begin{array}{r} \overset{3}{48} \\ 4 \\ \hline 192 \end{array}$

---

he graph of function f is shown on the right. **SCORE:** $2\frac{1}{2}$ **/ 4 PTS**
he graph consists of a diagonal line, an arc of a circle, then two additional diagonal lines.



] Evaluate $\int_{-10}^{10} f(x)\,dx$.
NOTE: You must show the arithmetic expression that you used to get your answer.

$-\left[\frac{1}{2}(2)(10)\right] - \left(\frac{1}{2}\cdot\pi 2^2\right) + \frac{1}{2}(4)(8) + \frac{1}{2}(8+4)6$ $\frac{1}{2}$

$\frac{1}{2}$ $-10 - 2\pi + 16 + 36$ $\frac{1}{2}$

$\boxed{42 - 2\pi}$

] Evaluate $\int_{10}^{-4} f(x)\,dx$. $= -\int_{-4}^{10} f(x)\,dx$ 1

$-\left[-\frac{1}{4}\pi 2^2 + 16 + 36\right]$

$-[-\pi + 52] = \boxed{\pi - 52}$

Using the limit definition of the definite integral, and right endpoints, find $\int_{-4}^{-1}(2x^2+8x)\,dx$. **SCORE: 10 / 10 PTS**

NOTE: Solutions using any other method will earn 0 points.

$x_i = a + i\Delta x$

$\Delta x = \dfrac{-1-(-4)}{n} = \dfrac{3}{n}$

$\left(\frac{3i}{n}-4\right)\left(\frac{3i}{n}-4\right)$

$\frac{9i^2}{n^2} - \frac{24i}{n} + 16$

$(n^2+n)(2n+1)$

$2n^3+n^2+2n^2+n$

$n^3\left(2+\frac{3}{n}+\frac{1}{n^2}\right)$

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}(2x_i^2+8x_i)\Delta x$ ① ②

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\left[2\left(-4+\frac{3i}{n}\right)^2+8\left(-4+\frac{3i}{n}\right)\right]\frac{3}{n}$ ①

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\left[2\left(16-\frac{12i}{n}-\frac{12i}{n}+\frac{9i^2}{n^2}\right)+\left(-32+\frac{24i}{n}\right)\right]\frac{3}{n}$

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\left[\cancel{32}-\frac{48i}{n}+\frac{18i^2}{n^2}-\cancel{32}+\frac{24i}{n}\right]\frac{3}{n}$

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\left(-\frac{24i}{n}+\frac{18i^2}{n^2}\right)\frac{3}{n}$ ②

$\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}-\frac{72i}{n^2}+\frac{54i^2}{n^3}$

$\lim\limits_{n\to\infty}-\frac{72}{n^2}\sum\limits_{i=1}^{n}i+\lim\limits_{n\to\infty}\frac{54}{n^3}\sum\limits_{i=1}^{n}i^2$

$\lim\limits_{n\to\infty}-\frac{72}{n^2}\cdot\frac{n(n+1)}{2}$ ① $+\lim\limits_{n\to\infty}\frac{54}{n^3}\cdot\frac{n(n+1)(2n+1)}{6}$ ①

$\lim\limits_{n\to\infty}\frac{54}{\cancel{n^3}}\cdot\frac{\cancel{n^3}\left(2+\frac{3}{n}+\frac{1}{n^2}\right)}{\cancel{6}\,3}$

18

+① $\lim\limits_{n\to\infty}$

$-36+18=-18$ ①

Evaluate $\int_{-6}^{0}\left(2\sqrt{36-x^2}-|x+2|\right)dx$ using the properties of definite integrals and interpreting in terms of area. **SCORE: 5 / 5 PTS**

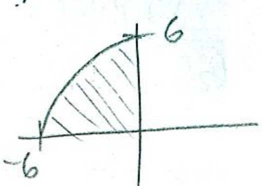
NOTE: You must show the proper use of the properties of the definite integral, NOT just the arithmetic.

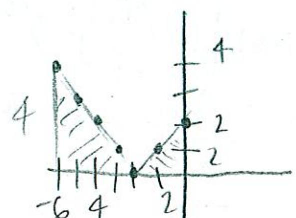
$2\int_{-6}^{0}\sqrt{36-x^2}\,dx-\int_{-6}^{0}|x+2|\,dx$ ②

$2(9\pi)-10$

$18\pi-10$ ①

$y^2+x^2=36$





① $\frac{1}{4}\pi 6^2$

$\frac{1}{4}\cdot 36\pi$

9π

$\frac{1}{2}(4)(4)+\frac{1}{2}(2)(2)$ ①

$8+2$

10